APPENDIX B
PRESTORM/STORM/AND STORM RECOVERY OPERATIONS FOR THE SOUTH DADE CONVEYANCE SYSTEM

Pre-Storm / Storm / and Storm Recovery Operations for the South Dade Conveyance System

This document is in draft and provides criteria to be used in preparing the South Dade Conveyance System (SDCS)/Miami Dade County for forecasted storm events. The SDCS is composed of L-31N, L-31W, and C-111 canal system and control structures. Currently, for the East Coast Canal System, the canal system and control structures to the east of L-31N, the South Florida Water Management District (SFWMD) implements canal drawdown operations based on impending rainfall events. The goal for the SDCS is to develop a similar set of canal drawdown operating criteria which seek to balance the needs of the natural system with the authorized purposes of the Central and Southern Florida (C&SF) Project, which is multipurpose in scope and includes flood control and water supply.

The hurricane season is from June through November. When there are tropical depressions, tropical storms, and/or hurricanes in the Atlantic/Caribbean Basin, the National Hurricane Center (NHC) issue tropical cyclone public advisories, forecast advisories, forecast discussions, and strike probability forecasts* every 6 hours.

* {For the period 1989-1998, the average location error by forecast period was 55 statute miles at 12 hours, 102 miles at 24 hours, 147 miles at 36 hours, 164 miles at 48 hours and 278 miles at 72 hours. The strike probability forecast indicate the statistical chance that the tropical cyclone center will pass within 75 statue miles of a specified location within 3 days of the initial forecast time. The maximum strike forecast probabilities are 10-15% at 72 hours, 20-25% at 48 hours, 25-35% at 36 hours, 40-50% at 24 hours, an 75-85% at 12 hours.}

The SFWMD employs meteorologists who evaluate each tropical event and prepare average forecast errors using NHC forecast tracking maps. The average forecast error means when the Hydrometeorologic Prediction Center (HPC) or NHC has forecasted a specific track and the cyclone could end up anywhere in that "swath" within the next 72 hours with around a 60% confidence level. The average forecast error swath is based on the 10-year average of forecast errors.

The SFWMD Operations Control Division has defined operational procedures to be implemented depending on the timing or amount of advance warning prior to the onset of tropical storm force winds. The Corps of Engineers also has defined in the Master Water Control Manual for each part of the Central and Southern Florida Project (C&SF) a water control plan with instructions for pre-storm operations for structures around Lake Okeechobee and the Water Conservation Areas. The SFWMD operational procedures are termed "Conditions", the specific operating procedures for these conditions will be described in further detail in this document. Conditions are briefly summarized as follows:

- Condition 4, 72 – 48 hours prior to the impact of tropical storm force winds, is earliest level of preparation when the system is evaluated and initial adjustments made to operations

depending on the forecast and nature of the storm. Coordinate with the Corps of Engineers and local drainage districts

- Condition 3, 48 – 24 hours prior to the impact of tropical storm force winds, continue pre-storm operations and coordination with the Corps of Engineers and local drainage districts.
- Condition 2, 24 – 12 hours prior to the impact of tropical storm force winds, bring telemetry-controlled sites to final pre-storm configuration, establish alternate emergency control station if necessary.

The remaining levels of preparation are Condition 1, 12 – 0 hours prior to the impact of tropical storm force winds; During the event; and Recovery after the event. It is important to note that some storm events do not allow for the full condition 4 with even 48 hours of advance warning.

It is important to emphasize that the Central and Southern Florida Project is multi-purpose in design, and that pre-storm operations may not prevent flooding, such as experienced after Hurricane Irene in October 1999 or the no name storm in October 2000. The condition of the groundwater system at the time of a storm event is significant and is highly dependent on the amount and extent of rainfall that has already occurred prior to subsequent events. Further, there are areas of Dade County, and South Florida in general, which are at low elevations and for which no amount of drawdown can prevent flooding depending on the amount and extent of the event. The water levels discussed in this document are target levels and may not be attainable.

During the Cape Sable seaside sparrow nesting season, March 1 through July 15, or until nesting success, as defined in the Fish and Wildlife Service February 19, 1999 Final Biological Opinion, has been met, pumping at S-332D and S-332 is limited to 165 cfs. This constraint on pumping may limit the ability to implement pre-storm operations. At this time, the USACE Hydrologic Investigation Section is preparing modeling to determine possible impacts to sparrow nesting or implementing pre-storm operations.

Notification and Briefing Process

The Executive level will be briefed prior to initiation of pre-storm operations. This may occur prior to 72 hours or as soon as the average error forecast swath shows South Florida to be likely to be in the path of a storm. Obtaining Executive level approval is important in order to demonstrate to interested parties, such as the Fish and Wildlife Service and the National Park Service, that operations were not arbitrary or capricious and that possible impacts to the sparrow or to the natural system were considered; however, in order to maintain the multi-purpose functioning of the C&SF project, flood control operations were necessary.

1. Conditions 4 and 3 (24 to 72 Hours Prior to Storm Conditions)

Based on the Executive level orders, up to 72 hours in advance of a storm.

Drawdown Implementation:

Between 24 and 72 hours before tropical storm conditions in Miami-Dade, the following target water levels are set for the SDCS. The initiation of the pre-storm drawdown criteria would be triggered when Dade County is within the average error forecast swath as developed by the

NHC. These pre-storm drawdown levels are not less than the level at which water supply deliveries are made during dry periods, that is 1.5 ft below optimum canal levels, except the reach north of G-211, which is 1.0 ft below current, normal operating levels. These levels are target levels and may not be attainable.

Table 1.

Canal	Reach	Target Level for Draw-Down (ft)
L-31N	G-211 to S-331	4.0*
L-31N	S-331 to S-176	4.0
L-31W	S-174 to S-175	No target
C-111	S-176 to S-177	3.0
C-111	S-177 to S-18C	2.0
C-111	S-18C to S-197	No change**

*If Angel's well is 5.5 ft-NGVD or below, then 4.0 would be the target, otherwise, 3.5 ft-NGVD at the headwater of S-331 will be the target.

**Operation as specified in the SFWMD structure book for S-197

Sequence for Achieving Target Levels

In an effort to achieve the specified drawdown targets, a sequence of operational actions is recommended as described in Table 2. The goal is achieve one target before proceeding the next sequence, however, it may not be possible to achieve the target level and operations will proceed as based on the best available information at the time:

Table 2.

Sequence	Canal	Reach	Target Draw-Down Level (ft)
1	L-31N	S-331 to S-176	4.0
	C-111	S-176 to S-177	3.0
2	L-31N	G-211 to S-331	4.0*
	L-31N	S-335 to G-211	5.0

* If Angel's well is 5.5 ft-NGVD or below, then 4.0 would be the target, otherwise, 3.5 ft-NGVD at the headwater of S-331 will be the target.

S-332B

Operational criteria are being developed to meet the RPA requirements. The criteria will take into account pre-storm and storm operations, except emergency deviations that must always be dealt with on a case-by-case basis. S-332B is a part of the Central and Southern Florida (C&SF) Project, which is multipurpose in scope. While S-332B allows flexibility to operate the C&SF project to better meet the needs of the Cape Sable seaside sparrow it may also be used for meeting other project purposes such as flood control.

Table 3.

Rising Water Level (ft)	Discharge (cfs)	Falling Water Level (ft)	Rated Discharge (cfs)
4.7	75*	5.0	450
4.9	200**	4.9	325
5.0	325	4.8	200**
5.1	450	4.7	75*
5.2	575	4.2	0

* Start with 125-cfs pump if 75-cfs pump is not operational
** This will cause overflow of the weir in the retention area

During pre-storm operations, the criteria for operation of S-332B would be the same as under normal operations, however, the notification procedure is to take place prior to changes in the upstream or downstream structural operations. Refer to the notification and briefing process section of this document regarding briefing the Executive level prior to initiating pre-storm operations.

S-197

No change is suggested in the operational criteria for this structure during Condition 4. The operational criteria is defined the SFWMD structure book for S-197.

2. Condition 2 and 1 (12 to 24 Hours Prior to Forecast arrival of tropical storm force winds).

Continue operations as in Condition 4 and 3, but with the following considerations:

Table 4.

Structure	Status
S-331	Secure. Do not operate during storm.
S-332B	Secure. Personnel move to S-332D office area during storm.
S-332D	Continue pumping. Office area is hardened.
S-175	Keep closed
S-197	Consideration to be given to open 3 gates

S-332B

Pumps are secured for safety reasons. Personnel should move to S-332D for protection from tropical storm force winds, and to await resumption of operations at S-332B.

S-197

Operation of this structure requires mobilization of field personnel and equipment to operate the gates. It is not safe to operate this structure during storm conditions. Consequently, depending on conditions, three gates may be opened at Condition 1.

3. Recovery (Conditions immediately after the storm ends or if the storm forecast changes such that Dade County is no longer likely to be affected.)

Operations during Recovery consist of: 1) Maximizing discharges at water control structures to minimize flooding and 2) make the transition back to operational regime in place prior to the storm.

Operations may also be returned to levels prior to implementing pre-storm operations as soon as the Dade County is no longer within the average forecast error swath.

Plan for Worst Case: Recovery would be necessary if storm conditions result in significant rainfall in the Miami-Dade County area. The target for operations would be to return to operational regime in place prior to the storm. However, use of water control structures (e.g., S-175, S-332B) under emergency flood control mode would begin or continue until Recovery is complete. The following operations are suggested to continue to operate in emergency flood control mode:

Table 5.

Structure	Status
S-331	Pump when downstream conditions allow
S-332D	Continue to pump
S-175	Use of this structure would be on a case-by-case basis with concurrence from the Department of Interior.
S-197	Open depending on conditions
S-332B	Resume pumping according to proposed operational criteria. As normal operations are resumed, as evidenced by opening of G-211 and/or reduction of discharges at S-197, DOI will provide recommendations to the Corps for use in their decision regarding continued operations at S-332B.

Sequence for Achieving Normal Operating Ranges

It is not possible to describe the sequence of operational actions during Recovery prior to a particular storm event. The sequence of operational actions will depend largely on the rainfall distribution and rainfall amounts resulting from the storm.

4. Back to Normal Mode (Operational regime in place prior to the storm)

The following conditions must be met before ceasing emergency flood control mode and resuming normal mode:

1. DOI will advise the Corps of any overflow problems or adverse impacts to the CSSS Subpopulation F that may be occurring for the Corps to use in their decision regarding pumping reductions at S-332B.
2. Otherwise, stages in canal reaches must be within the specified operating ranges in place prior to the change to pre-storm or storm operations to resume normal mode.

Once these conditions are met, the normal mode, as defined by operational regime in place prior to the storm, may be resumed. Emergency use of certain water control structures, such as S-175 and S-332B, would cease.

This document may be modified depending on additional information, as it becomes available.